

CLAIMS

That which is claimed is:

1. A laser including an external cavity, comprising:
 - (a) a channel selector tuner configured to tune said laser to a selected channel; and
 - (b) an external cavity tuner configured to tune said external cavity to a selected optical path length;
 - (c) said channel selector tuner independently operable with respect to said external cavity tuner.
2. The laser of claim 1, wherein:
 - (a) said channel selector tuner is operable according to a channel selection signal; and
 - (b) said external cavity is operable according to a cavity mode signal.
3. The laser of claim 2, wherein said channel selection signal is derived independently from said cavity mode signal.
4. The laser of claim 3, wherein:
 - (a) said channel selection signal is derived from channel selector tuning data in a look-up table; and
 - (b) said cavity mode signal is derived from a detector configured to measure external cavity loss associated with cavity optical path length.
5. The laser of claim 1, wherein:
 - (a) said channel selector tuner is operatively coupled to a first controller and operable according to channel selector tuning data in a look-up table; and
 - (b) said external cavity tuner is operatively coupled to a second controller and operable according to error signals derived from a detector

configured to measure external cavity loss associated with cavity optical path length.

6. An external cavity laser, comprising:
 - (a) a wavelength tuning mechanism configured to select a transmission wavelength according to a wavelength selection signal; and
 - (b) an external cavity mode tuning mechanism configured to select a cavity optical path length according to a cavity mode signal;
 - (c) said wavelength tuning mechanism configured to operate independently from said cavity mode tuning mechanism.
7. The external cavity laser apparatus of claim 6, wherein said wavelength selection signal is derived independently from said cavity mode signal.
8. The external cavity laser apparatus of claim 7, wherein:
 - (a) said wavelength selection signal is acquired from wavelength selection data stored in a look-up table; and
 - (b) said cavity mode signal is derived from a detector configured to measure external cavity loss associated with cavity optical path length.
9. The external cavity laser apparatus of claim 6, wherein:
 - (a) said wavelength tuning mechanism is operatively coupled to a first controller and operable according to wavelength tuning data in a look-up table; and
 - (b) said external cavity tuning assembly is operatively coupled to a second controller and operable according to error signals derived from a detector configured to measure external cavity loss associated with cavity optical path length.
10. An external cavity laser apparatus, comprising:
 - (a) a wavelength tuning element; and
 - (b) an external cavity mode tuning element;

- (c) said wavelength tuning element configured to tune orthogonally with respect to said external cavity mode tuning element.
11. An external cavity laser apparatus, comprising:
- (a) a wavelength tuning assembly; and
 - (b) an external cavity optical path length tuning assembly;
 - (c) said wavelength tuning assembly operable uncoupled from said external cavity optical path length tuning assembly.
12. An external cavity laser apparatus, comprising:
- (a) a gain medium having first and second output facets, said gain medium emitting a coherent beam from said first output facet along an optical path;
 - (b) an end mirror located in said optical path, said end mirror and said second output facet defining an external cavity;
 - (c) a wavelength tuning element positioned in said optical path before said end mirror;
 - (d) a wavelength tuning assembly operatively coupled to said wavelength tuning element and configured to adjust said wavelength tuning element; and
 - (e) a cavity optical path length tuning assembly operatively coupled to said external cavity and configured to adjust said external cavity optical path length;
 - (f) said wavelength tuning assembly configured to operate independently from said cavity optical path length tuning assembly.
13. The external cavity laser apparatus of claim 12, wherein:
- (a) a wavelength tuning assembly operates according to a wavelength selection signal; and
 - (b) said cavity optical path length tuning assembly operates according to a cavity mode signal;

- (c) said wavelength selection signal derived independently from said cavity mode signal.

14. The external cavity laser apparatus of claim 13, wherein, said wavelength selection signal is derived from wavelength tuning data in a look-up table.

15. The external cavity laser apparatus of claim 13, wherein said cavity mode signal is an error signal derived from a detector configured to measure external cavity loss associated with cavity optical path length.

16. The external cavity laser apparatus of claim 15, wherein said detector comprises a voltage sensor configured measure voltage modulation across said gain medium.

17. The external cavity laser apparatus of claim 13, further comprising a modulation element, said modulation element operatively coupled to said external cavity and configured to introduce a modulation to said cavity optical path length, said modulation usable to derive said cavity error mode signal.

18. The external cavity laser apparatus of claim 13, wherein said cavity optical path length tuning assembly comprises a thermally tunable compensating member, said thermally tunable compensating member coupled to said end mirror.

19. The external cavity laser apparatus of claim 13, further comprising a grid generator positioned in said optical path.

20. A method for tuning an external cavity laser, comprising:

- (a) tuning a channel selector with a first tuning element according to a first, wavelength selection signal; and
- (b) tuning an external cavity optical path length with a second tuning element according to a second, cavity mode error signal;

- (c) said tuning said channel selector carried out independently from said tuning said external cavity optical path length.

21. The method of claim 20, wherein said first, wavelength selection signal is derived independently from said second, cavity mode signal.

22. The method of claim 20, wherein said tuning by said first tuning element is carried out substantially orthogonally with respect to said tuning by said second tuning element.

23. The method of claim 20, further comprising:

- (a) controlling said first tuning element with a first controller; and
- (b) controlling said second tuning element with a second controller.

24. The method of claim 20, further comprising:

- (a) deriving said first, wavelength selection signal from a stored look-up table of adjustment parameter data; and
- (b) deriving said second, cavity mode error signal from output from a sensor configured to monitor external cavity loss associated with said external cavity optical path length.

25. The method of claim 24, wherein said deriving said second, cavity mode error signal comprises monitoring voltage modulation across a gain medium associated with said external cavity.

26. The method of claim 24, wherein said deriving said second, cavity mode error signal comprises introducing a frequency modulation to said external cavity optical path length, said frequency modulation detectable by said sensor.

27. A laser apparatus, comprising:

- (a) wavelength tuning means for adjusting a channel selector;
- (b) external cavity tuning means for adjusting optical path length, and

- (c) means for decoupling said wavelength tuning means from said external cavity tuning means.

28. The laser apparatus of claim 27, further comprising:

- (a) means for deriving a wavelength selection signal for said wavelength tuning means; and
- (b) means for deriving an optical path length signal for said external cavity tuning means;
- (c) said wavelength signal deriving means operable independently from said optical path length signal deriving means.

29. The laser apparatus of claim 27, wherein said wavelength tuning means comprises wavelength selection control means for actuating a channel selector according to signals derived from optical output of said laser.

30. The laser apparatus of claim 29, wherein said external cavity tuning means comprises external cavity control means for actuating a reflector according to signals derived from voltage monitored across a gain medium of said laser.